



*Groundwater
Science Corp.*

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March 12, 2010

Mr. Nick Toth
Capital Paving Inc.
P.O. Box 815,
Guelph, Ontario
N1H 6L8

Dear Mr. Toth:

**RE: Monitoring Recommendation Update
Proposed Capital Paving Inc. Montrose Pit.**

Further to the November 25, 2009 meeting held with the Region of Waterloo regarding initial findings of the Region's review of the Capital Paving Inc. Proposed Montrose Pit Scoped Subwatershed Study (September 11, 2009), we are providing an updated set of monitoring program recommendations for the site. The recommendations include some additional water level and water quality monitoring at the site during operations and the development of initial threshold values in response to the concerns expressed at the meeting. Overall, the recommendations provide a substantial level of protection for both natural environment features (wetlands, streams, etc.) and local water wells.

In general, issues raised at the meeting by Ian Macdonald (WESA Inc.) on behalf of the Region include the following:

- there is general agreement that localized impacts are not expected on a local or subwatershed scale, however there are some questions regarding the effects of water taking;
- a robust monitoring program is the "key" to ensuring the Region that impacts will not occur;
- water level monitoring specific to proposed water taking operations should occur to ensure any potential associated water level changes do not extend to natural environment features or wells;
- additional water level monitoring locations should be installed to provide information east of the site and near the northwest corner of the site;
- enhanced water quality monitoring should occur; and,
- initial threshold levels for Extraction Phases 1 to 4 should be developed now.

In order to provide enhanced water level monitoring related to the proposed water taking operations, we recommend that the water level monitoring occur using dataloggers (in addition to the proposed manual measurements) at the following locations: source pond, silt pond, BH7 and BH8. The recommended datalogger monitoring frequency is hourly during operational periods. The data would be downloaded and reviewed during each manual monitoring event. Monitoring at the source and silt ponds would occur within stilling wells installed for that purpose.

Monitoring at BH7 would provide an indication of groundwater level changes immediately adjacent to the water taking operations. Monitoring at BH8 would provide an indication of groundwater level changes distant from the operations, and, between the water taking and local shallow private wells. Seasonal threshold levels would be set for BH8, DP5 and DP6, and, any threshold level exceedance would result in a contingency response related to water taking operations, ensuring that any potential change does not affect natural environment features or local wells.

Two additional water level monitoring locations are proposed to be installed before extraction operations begin. The locations are shown on the attached figure. These locations would be monitored manually at the frequency proposed for all other locations. One drive-point (DP 7) would be installed within the "slope seep" location north of BH8 (see Scoped Watershed Study Figure 7.0). This location would serve to monitor conditions between the site and the river, and between the water taking and the private wells. One monitoring well or drive-point (DP8) would be installed on the adjacent property east of the site, likely along the edge of the woodlot. This location would provide an indication of the extent of any water level change east of the site.

One set of general water quality samples have been obtained at the site to examine existing conditions and establish a baseline at the site. Monitors BH2, BH6, BH7, BH8, DP5 and DP6 were sampled. BH2 represents groundwater quality flowing onto the site from the east. BH6 represents groundwater quality near the mid-point of the flow system across the site. BH7 and BH8 represent groundwater quality at the west edge of the site (where groundwater flows off-site). DP5 and DP6 represent groundwater quality within the wetland area, and, between the site and the Grand River. BH 4 was not sampled because it is installed primarily in the silt/clay till unit, has a very slow response, and, as such it was difficult to obtain a representative sample. DP1, DP2 and DP3 all represent upgradient or cross-gradient locations within the flow system. These locations would provide an indication of water quality flowing onto or adjacent to the site. For example DP1 is adjacent to BH2 and is unlikely to provide any additional information. DP2 and DP3 are within a flow system associated with the northern tributary and adjacent to (along the north edge of) the site. DP2 would also likely be affected by the surface water quality within the tributary and therefore not representative of groundwater quality at the site.

Additional water quality monitoring is now proposed during operations to ensure there are no detrimental water quality impacts to natural environmental features or water wells. We propose to sample the groundwater quality flowing onto the site, at BH2 and BH4 (if possible); groundwater quality leaving the site, at BH7 and BH8; and, groundwater quality between the site and both the river and private wells, at DP5, DP6 and DP7. Sampling is to occur in early spring and late summer each operational season.

Seasonal water level thresholds are proposed for Extraction Phases 1 to 4. During these extraction phases the activities that could result in potential water table change includes the excavation of the wash ponds and the water taking for washing purposes. The thresholds would ensure that any potential water level change associated with these activities would not extend to, or result in detrimental effects (water table lowering) at, natural environment features and private wells. The thresholds would also provide assurance that there are no detrimental water table effects associated with activities that are not expected to affect the water table (such as above water table extraction).

Seasonal threshold levels are proposed for winter (December to March), spring (April and May), summer (June to September) and fall (October and November), based on observed low water levels to date during these seasonal periods. Thresholds are recommended for BH2, BH4, BH6, BH8, DP5 and DP6 as representing conditions at a variety of radial distances from the water taking location and conditions at the perimeter of the site between water taking operations and potential receptors. If water levels are maintained at these locations, off-site impacts will not occur.

Graphs illustrating the monitoring results to date, and showing proposed threshold levels, are attached to this letter. Note that the data set to date is limited for locations DP5 and DP6, and therefore revisions can be expected to those thresholds prior to extraction activities. During operations water level threshold exceedances would trigger implementation of the Mitigation and Contingency Plan, which has been expanded to include options related to water taking.

The following groundwater monitoring program is recommended to respond to concerns:

Groundwater Monitoring Program

Extraction Phases 1 to 4:

- Prior to extraction at the site monitors DP7 and DP8 (completed as drive-points or water table monitoring wells) shall be installed.
- Stilling wells shall be installed in the wash water source pond and the silt pond as soon as possible after the ponds are constructed.
- All monitoring locations are to be maintained in good repair and if damaged, repaired or replaced as soon as possible.
- Dataloggers shall be installed at both wash water ponds, BH7 and BH8 each year prior to water taking at the site. The datalogger monitoring frequency shall be hourly and data shall be downloaded on a monthly basis (as accessible). Each year data logger monitoring shall continue throughout the water taking operational season.
- Monthly manual water level measurements shall be obtained at BH2, BH4, BH6, BH7, BH8, DP1, DP2, DP3, DP5, DP6, DP7 and DP8 (as accessible) each year of operations.
- Groundwater quality sampling shall occur in early spring and late summer of each year of operations. Water quality sampling shall occur at BH2, BH4 (if possible), BH7, BH8, DP5, DP6 and DP7. The water quality analysis shall include typical scans for Anions and Metals, in addition to BTEX and hydrocarbons F1-F4.
- The monitoring data for each year of operations including any threshold response or mitigation measures undertaken, shall be summarized in an annual report submitted to MNR, MOE, GRCA, the Region and the Township.

Extraction Phases 5 to 8:

- All monitoring locations are to be maintained in good repair and if damaged, repaired or replaced as soon as possible.
- Dataloggers shall be installed at both wash water ponds, BH7 and BH8 each year prior to water taking at the site. The datalogger monitoring frequency shall be hourly and data shall be downloaded on a monthly basis (as accessible). Each year data logger monitoring shall continue throughout the water taking operational season.
- Monthly manual water level measurements shall be obtained at BH7, BH8, DP5, DP6 and DP7 (as accessible) each year of operations.
- Manual water level measurements shall be obtained every second week during operational periods, and monthly measurements shall be obtained during non-operational periods, at BH2, BH4, BH6, DP1, DP2, DP3 and DP8 (as accessible).
- Groundwater quality sampling shall occur in early spring and late summer of each year of operations. Water quality sampling shall occur at BH2, BH4 (if possible), BH7, BH8, DP5, DP6 and DP7. The water quality analysis shall include typical scans for Anions and Metals, in addition to BTEX and hydrocarbons F1-F4.
- The monitoring data for each year of operations including any threshold response or mitigation measures undertaken, shall be summarized in an annual report submitted to MNR, MOE, GRCA, the Region and the Township.

Trigger Levels

Extraction Phases 1 to 4:

Threshold levels related to water taking operations and the above water table excavation in Extraction Phases 1 to 4 are as follows:

Location	Water Level Threshold Elevation (mAMSL)			
	Winter (Dec. to Mar.)	Spring (Apr., May)	Summer (June to Sept.)	Fall (Oct., Nov.)
BH2	334.38	334.80	334.40	334.25
BH4	334.22	334.47	333.67	333.31
BH6	325.64	325.98	325.60	325.64
BH8	324.66	324.77	324.57	324.60
DP5	320.32	n/a	320.32	320.31
DP6	320.07	n/a	320.25	319.95

The water level thresholds (including Spring thresholds for DP5 and DP6) shall be revised or confirmed to the satisfaction of MNR, MOE, GRCA, The Region and the Township immediately prior to extraction operations at the site based on monitoring data available at that time.

Extraction Phases 5 to 8:

Threshold levels related to water taking operations and the above water table excavation in Extraction Phases 5 to 8 for locations BH2, BH4, BH6, BH8, DP5 and DP6 shall be the same as those established for Extraction Phases 1 to 4.

In addition, prior to the installation of the water table control drain trigger levels for water level elevations at BH2, BH4, DP1, DP2, DP3 and DP8 be developed to the satisfaction of MNR, MOE, GRCA, The Region and the Township.

Mitigation Measures and Contingency Plan

Private Well Interference:

- Where the Ministry of Natural Resources with the assistance of the Ministry of the Environment has determined that the operation of the pit has caused any well water to be adversely affected, the licensee shall, at the licensee's expense, either deepen the well or replace the well to ensure that historic water production quality standards are maintained for that well. If this pit operation has caused a water supply problem, the licensee shall, at their expense, ensure a continuous supply of potable water to the affected landowner.

Changes Related to Water Taking:

The following Mitigation and Contingency Plan options are recommended for the site related to water taking, to be implemented individually or in combination and on an as needed basis in consideration of the type and extent of trigger threshold exceedance:

- a) Repeat monitoring event to confirm exceedance, increase monitoring frequency as appropriate.
- b) Assess monitoring results, extraction history and/or climate data to determine if threshold exceedance is linked to on-site activities

- c) Stop, alter or reduce water taking activities to allow groundwater system to equilibrate above threshold levels.
- d) Trench and install low hydraulic conductivity barrier(s) to isolate wash pond system from natural environment features or private wells.
- e) Implement other mitigation measures or contingency plans as developed in conjunction with, and approved by, appropriate regulatory agencies.

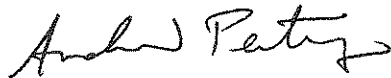
Changes Related to Water Table Control Drain:

The following Mitigation and Contingency Plan options are recommended for the site, to be implemented individually or in combination and on an as needed basis in consideration of the type and extent of trigger threshold exceedance:

- a) Repeat monitoring event to confirm exceedance, increase monitoring frequency as appropriate.
- b) Assess monitoring results, extraction history and/or climate data to determine if threshold exceedance is linked to on-site activities
- c) Stop, alter or reduce extraction or construction activities to allow groundwater system to equilibrate above threshold levels.
- d) Trench and install low hydraulic conductivity barrier(s) to further isolate tributary system from groundwater changes associated with the water table control system.
- e) Implement other mitigation measures or contingency plans as developed in conjunction with, and approved by, appropriate regulatory agencies.

We trust that the recommendations provided address the Region's concerns adequately. If you have any questions, or require further information, please do not hesitate to contact us.

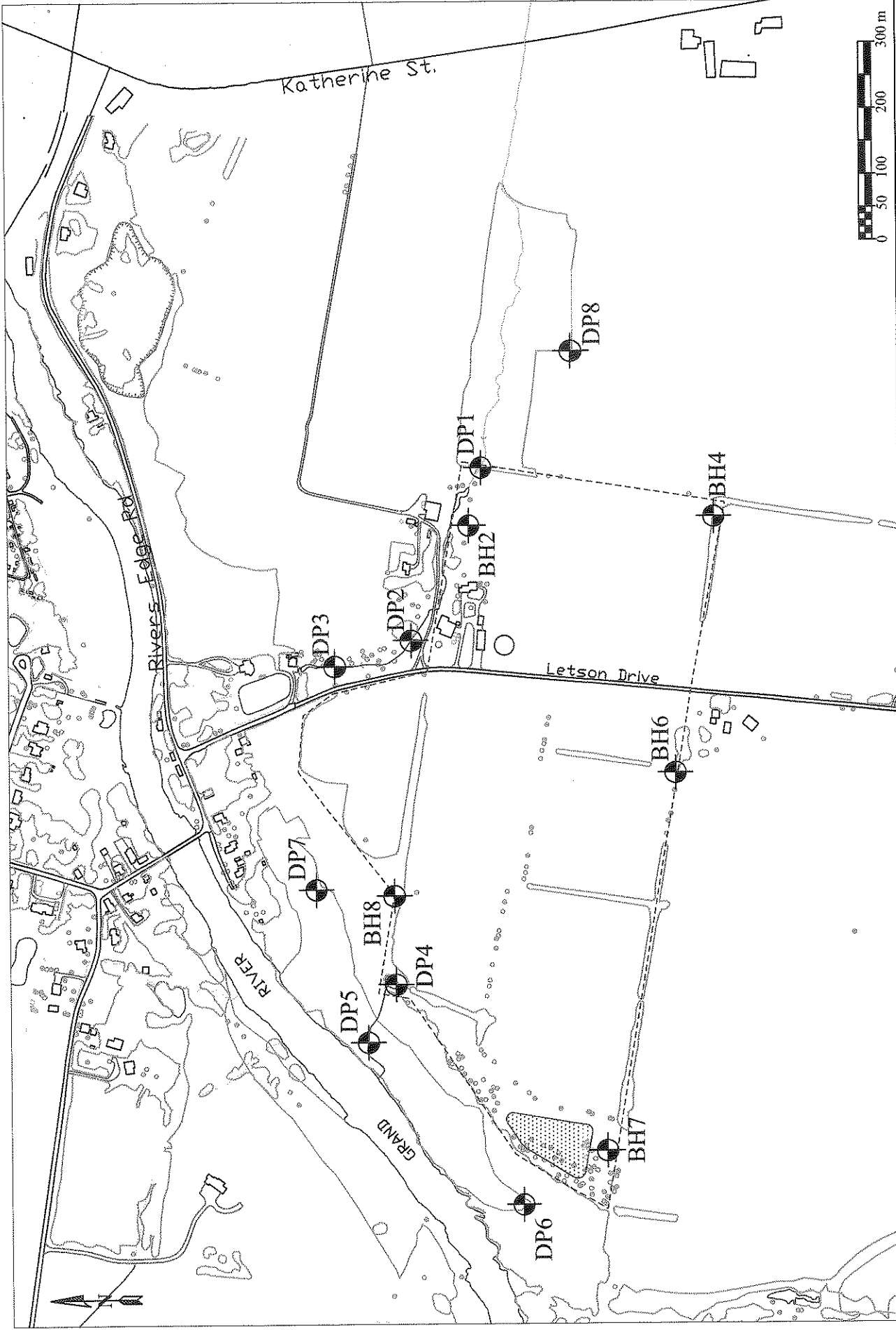
Sincerely,



Andrew Pentney, P.Geol.
Hydrogeologist

Cc: Bernie Janssen, Harrington and McAvan Ltd.

Enclosed: Figure 1
Water Level Monitoring Results and Proposed Thresholds (2 pages)



<p>Montrose Pit water level monitoring location note: DP7 and DP8 to be installed prior to extraction activities</p>		<p>Scale: as shown Date: March 2010</p>		<p>Montrose Pit Site Existing and Proposed Monitor Locations</p>	
		<p>Hydrogeologic Assessment</p>		<p>Capital Paving Inc. Proposed Montrose Pit Monitoring Program Recommendations</p>	
		<p>Groundwater</p>		<p>Science Corp.</p>	
<p>modified from: Site Plan (Harrington Hoyle Ltd.); and, 1:10,000 OBM Mapping UNDER LICENSE, WITHOUT PREJUDICE OR ENDORSEMENT FROM THE QUEEN'S PRINTER OF ONTARIO</p>					

